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ELECTRIC POWER AND POWER EQUIPMENT

GEOTHERMAL ENERGY PROBLEMS, PROPOSALS DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Jul 78 p 2

[Article by A. Amayev, chief of the Caucasian Industrial Administration for Utilizing Geothermal Energy (Makhachkala)]

[Text] The industrial use of geothermal waters began in our country slightly over ten years ago. A special industrial administration was created at Makhachkala. Why specifically in Dagestan? Because it is here that investigations were made over several years on the mode of the geothermal wells and corresponding experience was accumulated in this direction.

At first, the administration was the only one in the republic. It was faced with many problems: organize the extraction of geothermal water and sell it to consumers. This was just half of the job. Besides, it was necessary to order the drilling for geothermal waters, and the restoration of petroleum and gas wells, so that they could be utilized for this purpose.

Work had to be done not only in Dagestan, but also in Georgia, Chechen-Ingushetiya, and Krasnodarskiy and Stavropol'skiy Krays. Gradually, such industries were created in all these regions. It must be said that geothermal energy found wide use. To understand how important the work done here was, I will remind you that geothermal waters are a practically inexhaustible source of energy with the energy renewing itself, which is extremely important.

Geothermal water began to be used for heating, for supplying hot water to industrial enterprises, municipal-domestic, hospital and children's establishments, as well as for bottling, like mineral water, and for heating hothouses and hotbeds. At present, over 100 enterprises and establishments have contracts with the Caucasian Industrial Administration in Dagestan alone. In 1978, it is planned to extract and sell 9,700,000 cubic meters of hot water from here. This will save 27,742 tons of conventional fuel.

By the end of the five-year plan period, the number of users in Dagestan will be increased by those living in Makhachkala, Kizlyar, Izberbash, and the arid northern regions of the autonomous republic.

However, as the area of use of geothermal waters expands in the national economy, a number of difficulties and problems arise which urgently require a solution today. The situation is that until now the use of geothermal energy was studied by scientific research institutes fairly one-sidedly. A great deal was published on underground water in its geological and hydrogeological aspects. Methods were developed for calculating reserves and recommendations were made on their exploration. However, there are problems the solutions of which are, so far, difficult. How, for example, to combine the practical use of geothermal waters with high mineral content, and their content of dissolved gases and toxic substances? The lack of clear-cut norm instructions in this area slows down project planning and the construction of geothermal installations. Obviously, this does not facilitate the development of the industry as a whole.

Here is another unsolved problem. There are many wells on the territories of each industrial administration under the jurisdiction of various organizations and departments. In most cases, they are not controlled. This leads to the untimely exhaustion of geothermal water resources and to irreversible destruction of the wells. Apparently, the time has come to transfer the wells to the jurisdiction of specialized industrial administrations. Only then will they be operated properly.

The decree of the USSR Council of Ministers of 19 April 1963 "On development work for using geothermal energy in the national economy"specifies that, besides the Ministry of the Gas Industry, the following other ministries be involved in using geothermal waters: USSR Agriculture, RSFSR Housing-Municipal and USSR Power and Electrification. It was considered that they will be users of geothermal waters and will, therefore, work on rebuilding their heat consumption facilities. But, regrettably, the indicated ministries are still obviously attracted to traditional kinds of fuel. Their direct refusal to take the new kind of energy into account can be explained only by their not understanding all the advantages of using it.

We must also dwell on the organizational side. At present, our country has five administrations for utilizing geothermal energy and two exploring expeditions for drilling wells. Each industrial administration has its own construction-installation section. All these subdivisions can solve problems imposed on them by working together. It seems to us that it would be wise to create, in the Ministry of Gas Industry, a special administration for utilizing geothermal energy and to organize a production association on the basis of already existing enterprises. Such centralization would facilitate purposeful utilization of cheap energy and would solve, in this industry, all the problems the delays of which cannot be tolerated.

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ELECTRIC POWER AND POWER EQUIPMENT

KIRGIZ POWER PRODUCTION, TRANSMISSION DISCUSSED

Frunze SOVETSKAYA KIRGIZIYA in Russian 16 Jul 78 p 2

[Article by M. Azriliyan, chief of the Kirgizglavenergo Administration]

[Text] Power production in Kirgizstan is developing dynamically, at assured rates. In the Tenth Five- Year Plan period, it will be necessary to almost double the electric power output. Some 2500 kilometers of electric power transmission lines, 35kv and higher, will be put in operation. Among them is the LEP-500 Toktogul'skaya GES-Frunze line.

The planned work is being fulfilled successfully. In the past 2.5 years, the electric power plants of the republic produced 12.3 billion kw-hours of electric power. In the first half of this year alone, 3,120,000 kw-hours were produced -- as much as during all of 1967. A quarter of that was produced by the Toktogul'skaya GES.

Putting the Toktogul'skaya GES in operation saved 400,000 tons of natural fuel or 132,000 tons of fuel oil at the consolidated thermal electric-power plants system of Central Asia.

The socialist obligations of the collective of the largest GES in the republic -- to produce a billion kw-hours of electric power by the first anniversary of the new USSR constitution -- is being fulfilled successfully. Premises are being created for the production of additional 700 million kw-hours.

One of the most important problems to be solved by power workers is to provide the national economy with reliable electrical power at minimum cost for the production and transmission of power. Their success is facilitated by the acceleration of technical progress in the industry and the wide expansion of the innovator movement. Some 123 measures on new equipment, 1844 innovator proposals and 198 measures on scientific organization of labor were introduced since the start of the five-year plan period. Some 3,674,000 rubles were saved.

Hydraulic builders are coping successfully with their tasks. In 2.5 years, 152.2 million rubles of capital investments were assimilated -- more than planned.

The construction of the Kupsayskaya GES is proceeding at a fast rate. The hydraulic builders assumed the obligation to put two units in operation ahead of schedule -- in 1980. The construction tunnel and the Naryn dam were completed ahead of schedule. The work in the dam zone and the GES building is proceeding at an accelerated rate.

Special labor enthusiasm is being exhibited at the high priority construction site in the republic -- the Toktogul'skaya GES - Frunze LEP-500 electric power transmission line. It is being built under complex mountainous-climatic conditions. It crosses five mountain passes up to 3500 meters above sea level. Work is being done simultaneously on three sections. The erection of multiton poles and the installation of wires is being completed. The installers assumed the obligation of putting the power line in operation by the Day of the Power Worker -- 22 December 1978.

The result of mass socialist competition has been achieved. Over 1200 persons, dozens of collectives of enterprises, shops, sections and brigades assumed the obligations of completing the 1978 plan by 7 October. The word of the leading workers is supported by shock labor.

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ELECTRIC POWER AND POWER EQUIPMENT

ENERGY FROM SHALE PROVES ECONOMICAL

Tallin SOVETSKAYA ESTONIYA in Russian 23 Jul 78 p 2

[Interview with M. Z. Gudkin, chief engineer of the Estonian GRES]

[Text] As is well known, a large group of authors from the ESSR Academy of Sciences, the Central Boiler Turbine Institute imeni I. Polzunov, the "Estonglavenergo," the "Krasnyy Kotel'shchik" All-Union Production Association, the Estonskaya GRES, the Leningrad Department of the VGPI [All-Union State Planning Institute] "Teploelektroproyekt" and the "Sevenergostroy" wrote on the subject "Construction and assimilation in the Estonian SSR, for the first time in the world, of high power electric power plants using local shale fuel." The group was recommended for the USSR government bonus for 1978 in the field of science and engineering. Today, we publish an interview between our correspondent, S. Tarakanov, and one of the authors of the paper, M. Z. Gudkin, chief engineer of the Estonskaya GRES.

Question: The Pribaltiyskaya and Estonskaya GRES, operating on shale fuel, are without question, the first such powerful electric power plants in the world. Their construction and assimilation solved a number of large national economic problems. Will you, please, name the main ones?

Answer: First of all, for the first time in the world, combustible shales were included in the fuel-power balance, and the technical possibility has been proven of the economic expediency of their use in electric power production. Under the conditions of increasing scarcity and higher cost of fuel oil, the technical-economic expediency of shale increases considerably.

The use of Estonian shale in these GRES made it possible to save 66 million tons of the very scarce important fuel in the northwest and produce 166 billion kw-hour of electric power.

The problem was also solved of utilizing production wastes. Shale ash is a very good lime fertilizer widely used in agriculture in the non-blacksoil zone of the country. Both plants have created and assimilated complexes for gathering, transporting and mechanizing the loading of four million tons of this "fertility elixir" per year. Moreover, the ash is also used in production of construction materials.

The construction of the two giants of shale power production at Narva also changed the social face of the city. First, the demographic balance was restored -- before most of the population in the city consisted of women working in the "Krengol'mskaya Manufaktura." Secondly, the city which was destroyed during the war was not only restored in the shortest time, but even grew considerably.

Question: These are, one may say, global results of the creative efforts of many collectives of power machine builders, design and scientific research institutes, builders, installers and operational people, who found concentrated expression in your work. What, in your opinion, are the basic criteria for evaluating the labor of the large collective of authors recommended for the government bonus?

Answer: These are the efficiency and quality of power production. Power workers know that in producing electric power, almost 60 percent of the cost is due to the cost of fuel. Therefore, the basic directions in reducing production costs and, therefore, in raising the efficiency of power production is carrying out technical and organizational measures on reducing fuel and electric power consumption, as well as raising the reliability and power of the equipment which directly affects the efficiency of electric power plant operation, as a whole.

Question: Tell us, please, how these problems are solved at the Estonskaya GRES?

Answer: In 1977, the volume of production of electric power exceeded the level of 1975 by 1.456 million kw-hours. During this period, the consumption of conventional fuel per kw-hour decreased by 5.8 grams and the use of electric power for their own needs decreased by 0.86 percent. All of this made it possible to reduce the production cost of a kw-hour from 0.757 kopecks to 0.693 kopecks.

It may seem odd that we speak about such insignificant values -- grams of fuel, fractions of kopecks and fractions of percents. However, for the volumes of electric power produced today by the Estonskaya GRES per year, a reduction in the consumption of conventional fuel per kw-hour by only one gram saves 28,000 tons of shale and dozens of full-weight RR trains. A reduction in the consumption of electric power for their own use by 0.01 percent means almost a million additional kw-hours of electric power for the national economy. One hundredth of a kopeck saved in producing one kw-hour means an annual saving of 85,000 rubles.

At present, the Estonskaya GRES exceeds the rated indicators in volume of production and output of electric power.

Question: In conclusion, can the scientific research problems solved in creating electric power plants using shale fuel be used in other regions of our country?

Answer: In my opinion, yes. For example, when assimilating the very rich Kansko-Achinsk lignite deposits.

Of great importance to achievements in using shale for producing power is the growing interest exhibited by foreign specialists in this matter.

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ELECTRIC POWER AND POWER EQUIPMENT

AZRILYAN ON KIRGIZ POWER PRODUCTION

Moscow IZVESTIYA in Russian 19 Jul 78 p 1

[Article by V. Oliyanchuk (Frunze)]

[Text] Double the production of electric power in Kirgizia -- this was the directive of the 25th party congress. How is it being carried out? M. Azrilyan, chief of the Main Administration of Power and Electrification of the republic talks about it.

We are ahead of schedule in the rates of construction and assimilation of new capacities. In the 2.5 years of the five-year plan period, the republic produced 12.3 billion kw-hours of electric power or 101.3 percent of the plan. During the first half of this year alone, the national economy obtained more than three billion kw-hours -- as much as in all of 1969. A quarter of the power was produced by the Toktogul'skaya GES, one of the plants of the hydraulic power cascade on the Naryn River. The work of this GES made it possible to save 400,000 tons of natural fuel at thermal electric power plants of Central Asia. When it is taken into account that the water reservoir created behind the Toktogul'skaya GES dam helped irrigate many tens of thousands of hectares of fields in Kirgizia and Uzbekistan and produce large harvests of various crops, especially cotton, then the national economic effect of each kw-hour of electrical power of the plant can be assumed to be more than a ruble -- a very good yield.

People who built the Toktogul'skaya GES are now erecting the Kupsayskaya Plant down the river of Naryn, while the operational people decided to complete the task for 1978 ahead of schedule and produce 700 million kw-hours of additional electrical power.

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BRIEFS

GEOTHERMAL ENERGY -- RSFSR -- It is planned to build a geothermal electric power plant on the slopes of the Mutnovskiy Volcano about 80 kilometers from Petropavlovsk-Kamchatka. Underground reserves of steam and hot water, the largest on the peninsula, were discovered here. Staff workers of the Institute of Volcanology of the Far Eastern Scientific Center of the USSR Academy of Sciences proposed the idea of using geothermal energy as the main source of power in Kamchatka where, so far, no other fuel resources are available. The first experience in assimilating geothermal deposits indicated their high efficiency. Scientists developed a recommendation on the comprehensive assimilation of geothermal deposits. Such utilization of natural resources was recommended by Comrade L. I. Brezhnev while visiting various regions of Siberia and the Far East. The assimilation of the Mutnovskoye deposit will be the practical achievement of this advice. The new geothermal electric power plant will provide power to the Petropavlovskiy industrial center. [Text] [Kishinev SOVETSKAYA MOLDAVIYA in Russian 22 Jun 78 p 1] 2291

LENINGRAD AES -- Leningrad -- The installation of the steam and water pipelines -- the "Blue Arteries" of the third one million kw reactor unit was begun at the Leningrad AES imeni V. I. Lenin. Builders of the second stage of the largest nuclear power plant in the world must with truly jeweler's precision join hundreds of kilometers of pipe of various cross sections made of especially strong steel. Water and steam will circulate through them in the red hot interior of the reactor, through separators and turbines. "The construction of the new million kw unit proceeds strictly in accordance with the schedule" stated I. Lukonin, director of the plant. "At the same time; turbogenerators and other units and assemblies are being installed." Meanwhile, the two units of the first stage of the plant continue producing electric power with a constant reduction in operational costs. In the 4.5 years that have passed since starting the first reactor, almost 40 billion kw-hours were produced. So far, no other nuclear plant has produced so much electrical power. [Text] [Kishinev SOVETSKAYA MOLDAVIYA in Russian 25 Jun 78 p 1] 2291

SAYANO-SHUSHENSKAYA GES -- Zaporozh'ye -- A 533,000 kva power transformer was shipped almost a quarter of a year ahead of schedule to the Sayano-Shushenskaya GES from the main plant of the "Zaporozhtransformator"

Association. The collective completed delivery to the high priority construction site of the five-year plan period of a group of transformers intended for operation in the unit with the first hydraulic assembly of the plant, which the Sayan builders promised to put in operation in December of this year. [Text] [Moscow IZVESTIYA in Russian 19 Jul 78 p 1] 2291

KHARANOVSKAYA GRES -- Chita -- The first house of a settlement was built for power workers of the future 1,200,000 kw Kharanovskaya GRES. The beautiful name of Yasnogorsk was given it after the nearest power plant, Yasnaya, but it also corresponds to the place -- open, sunny, and people who produce light will live in it. The thermal electric power plant, the largest in the oblast, will make it possible to develop the economy here and electrify the Transsiberian RR further. The first power unit of the plant must produce current in the next five-year plan period. [Text] [Moscow PRAVDA in Russian 22 Jul 78 p 6] 2291

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ENERGY CONSERVATION

ENERGY, FUEL CONSUMPTION MEASURES

Moscow ENERGETIK in Russian No 7, Jul 78 pp 1-2

[Article by engineers G. G. Yakolev and G. A. Kruglov: "Fuel Conservation--A Vital National Economic Task"]

[Text] The economical and rational consumption of fuel and energy resources is of great importance to the national economy. The scale of development of power engineering requires constant perfection of the organization of the operation of power equipment and improved effectiveness of use of fuel and energy resources.

The total installed capacity of the Soviet Union's power plants in 1977 stood at 240 million kilowatts; electricity output stood at 1.15 trillion kilowatt-hours. Thermal power plant capacity constituted 76.3 percent, hydroelectric capacity 21.3 percent, and nuclear capacity 2.4 percent. In recent years, power capacities in thermal plants have been increased primarily by introducing economical power blocks of more than 200 megawatts capacity and central heating units with pressures of 130 and 240 kgf/cm^2. At present, power blocks and units of TETs of high and supercritical steam parameters constitue 74.9 percent of the overall capacity of thermal power plants.

Since the start of the current five-year plan, the country's power engineering workers, guided by the decisions of the 25th CPSU Congress, have been doing considerable work on the rational and economical use of fuel and energy resources.

In 1977, specific consumption of fuel to generate electricity and heat declined by 5.7 grams per kilowatt-hour and 0.4 kilograms per gigacalorie respectively compared with 1975, amounting to 334.4 grams per kilowatt-hour and 173.2 kilograms per gigacalorie. This has yielded a savings of 7.8 million tons of standard fuel. The economy has been achieved by perfecting the structure of electricity production, by increasing the effectiveness of central heating, by modernizing and improving the technical level of power plant equipment operation. In resolving tasks of increasing fuel economy in power plants, a vital role is played by the extensive development of

socialist competition, the study and generalization of the experience of the leading enterprises, and effective use of methods of moral and material incentive.

Substantial accomplishments have been made with regard to improving the reliability and economy of operation of condensation power blocks of 300 to 150 megawatts; coefficients of readiness of these blocks average 87 to 88 percent as against a normal 82 to 84 percent.

In the first two years of the five-year plan, the actual specific consumption of fuel declined respectively by 3.2, 1.1, and 0.6 grams per kilowatt-hour, respectively, for power blocks of 300, 200, and 150 megawatts capacity. Moreover, of the total number of power blocks in operation about 70 percent achieved or surpassed project indicators. On the average for groups of power blocks of 300, 200, and 150 megawatts the actual specific consumption was at the projected level.

The first 800-megawatts power blocks are being put successfully into operation at the Zaporozh'ye and Uglegorsk GRES's, for which the readiness coefficients have been raised to 72--76 percent. Among power plants with blocks of 300 megawatts capacity running on gas and fuel oil, the lowest specific consumption is being achieved at the Kostroma, Iriklinskaya, Karmanovskaya, and Lukoml'skaya GRES's--321 to 324 grams per kilowatt hour); in the case of those operating on standard fuel--the Reftinskaya and Yermakovskaya GRES's--334 to 336 grams per kilowatt hour.

The basic indicators of the power equipment in these plants are being maintained steady at normative levels. This is being achieved by complying with regime charts, setting optimal regimes, prompt implementation of preventive measures to maintain the cleanliness of heating surfaces, and high quality repair services.

At the same time, some power enterprises are not yet making full use of available possibilities to save fuel and energy resources. There are still substantial fuel losses as a result of negligence in storage and transport, delayed preparation of the enterprises for operation during the fall and winter period, and other reasons.

A large number of power plants are not making full use of economical turbogenerators because of discrepancies between installed and available capacities as a result of incomplete construction-installation work (delayed introduction of cooling towers, water recycling systems, fuel feed, smokestacks, and auxiliary equipment) and the presence of bottlenecks in the power plants' technological systems. Eliminating these shortcomings and the discrepancies in capacity will help to handle autumn and winter load maximums successfully and can yield an annual economy of at least 100,000 tons of standard fuel. Individual power plants are not achieving project indicators because of low operational economy of the equipment delivered by the manufacturing plants, the burning of nonstandard fuel, and shortcomings in operation.

The actual operational economy of the first modifications of 150-, 200-, and 300-megawatt turbines is two to five percent below projected economy. Guaranteed data for these turbines must be achieved as a result of modernization on the basis of existing plans and seeing to it that manufacturing plants deliver the necessary components and assemblies.

The job of improving the operational economy of the equipment and seeing to it that it is operated at normative levels requires prompt and high quality repair services. It has been noted that after repairs are completed, a substantial portion of the equipment does not attain normative indicators. Incomplete repairs to equipment units have occurred. There have been frequent cases of starting power blocks without PVD's [high-pressure heaters] because of being delayed in repair. After repairs, defects have been found causing breakdowns in equipment operation. Some 15 to 18 percent of the total number of emergency stoppages have taken place as a result of shortcomings in repair services in boilers of 300 megawatt power blocks.

In order to improve the quality of the repair service it is essential to speed up the conversion to the industrial-plant method of repairing portable equipment and to ensure the development of repair bases and enterprises, to raise the level of mechanization of repair work and to introduce in all power systems the evaluation of the quality of capital repairs to equipment on the basis of express testing.

One of the main reserves for improving the economy of electricity generation is to ensure increased effectiveness in central heating. In the first two years of the five-year plan, the output of electricity in the central heating cycle in thermal power plants rose by 0.6 percent, standing at 20.6 pereent in 1977. Thanks to this, the specific fuel consumption was reduced by an average of 1.1 grams per kilowatt-hour for all power plants. Central heating units with a total capacity of six million kilowatts were put into operation.

Utilization of the thermal capacity of the group of central heating turbogenerators of steam pressures of 130 kgf/cm^2 stands at 49 percent and is inadequate. At 15 TETs, utilization of thermal capacity was less than 20 percent because of the lack of a sufficient number of thermal consumers, the lagging development of heating networks, and substantial amounts of incomplete construction-installation on equipment to be introduced.

In order to improve the utilization of thermal capacity of central heating equipment, it is essential to carry out measures to eliminate bottlenecks in heating systems, to expand boiler and water preparation units, to speed up the construction of heating systems, to eliminate heating boiler facilities and to hook up appropriate heating loads to the TETs's. According to present proposals, the adoption of these measures will make it possible to achieve a savings of 3.6 million tons of standard fuel in the five-year plan.

The task of increasing the economy of electricity production in power associations requires resolving questions as to the substantiation of the dismantling of low-economy equipment or restricting its use by putting it into cold reserve during certain seasons of the year and mothballing it.

In the first two years of the current five-year plan, 1.3 million kilowatts of low-economy equipment were dismantled; this helped to reduce specific fuel consumption in thermal power plants by a total of 0.8 grams per kilowatt-hour.

In connection with the broad program construction of AES's [nuclear power plants] and the developing structure of capacities in the power systems, great importance attaches to problems of meeting peak loads. In addition to the necessity of introducing gas turbine and steam-gas units as quickly as possible, it is necessary to speed up work on perfecting the maneuverability characteristics of existing equipment in thermal power plants and extending their range of adjustment.

Because super critical pressure power blocks are being introduced to meet the variable portion of load schedules in power systems, the task arises of ensuring their economical operation under partial loads. One way to achieve this is to introduce the operation of power blocks on sliding pressure under partial loads.

A large volume of experimental work carried out on 300-megawatt gas-fuel oil power blocks has shown that during operation on sliding pressure with 50 and 30 percent of nominal loads, specific fuel consumption has been reduced by 4.5 and 12 grams per kilowatt-hour, respectively, compared with operation on nominal steam parameters. Similar work is being planned for 800- and 500-megawatt power blocks.

One reserve for extracting additional capacities from power blocks is to use built-in margins in the design of basic and auxiliary equipment. As a result of investigations of 26 300-megawatt gas and fuel oil power blocks the possibility was found of achieving a total additional capacity of up to 400 megawatts. Experimental verification at the Kostroma GOES showed that by ensuring a high level of operation and excellent technical equipment maintenance it is possible to achieve a total additional capacity of 60 to 70 megawatts. Similar projects must be carried out in powdered coal power blocks, where the terms of possible utilization of existing reserves must be determined.

One factor promoting economical fuel consumption in power plants is that of implementing constant and systematic efforts to adopt technically substantiated norms. At present, every thermal power plant of more than 10 megawatt capacity in the USSR Ministry of Power and Electrification has normative characteristics of boiler and turbogenerator units, also charts of calculated norms of specific fuel consumption. The task is to correct and revise them systematically when introducing new equipment, to change the type of fuel

systematically when introducing new equipment, to change the type of fuel burned, and the operating conditions, and to modernize.

The importance of the task of making economical use of fuel in power plants is determined by the constant rise in the scale of their development. In 1977, the generation of electricity and heat throughout the USSR Ministry of Power and Electrification consumed 417 million tons of standard fuel, including 28.6 percent fuel oil and 23.7 percent gas. In the concluding year of the current five-year plan, specific fuel consumption by thermal power plants will rise to 460 million tons. Reducing specific fuel consumption in all power plants by one gram per kilowatt-hour will yield a savings of about one million tons of standard fuel.

The degree of the CC CPSU on organizational and political work of the Kemerovskaya Oblast CPSU Committee to save fuel and energy resources in enterprises and projects of the sector notes that conservation of fuel and energy resources is viewed as a vital condition for further improvement of production effectiveness and for more fully meeting the national economy's rising fuel and energy requirements, for fulfilling and overfulfilling the 1978 plans and five-year plan targets.

The CC CPSU has directed officials of ministries, departments, associations, and enterprises to spearhead the campaign for thrifty, rational utilization of fuel and energy resources.

It is essential to ensure unconditional completion of planned targets with respect to fuel and energy conservation, to decisively halt instances of mismanagement and waste in their use. It is essential to see to it that the work of saving on fuel and electricity becomes the everyday job of workers, employees, and all power engineering personnel.

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FUELS AND RELATED EQUIPMENT

PUBLICATION ON OIL INDUSTRY ECONOMICS REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 3, May-Jun 78, pp 228-238

[Article by Yu.I. Maksimov: "Economic Problems--In Sector Journals"]

[Text] The scientific-economic abstract symposium EKONOMIKA NEFTYANNOY PROMYSHLENNOSTI [Economics of the Oil Industry] is published by the Ministry of the Oil Industry and the All-Union Scientific Research Institute of the Organization, Management and Economics of the Oil and Gas Industry. The printing is 2,600 copies.

The journal is presented by Doctor of Economic Sciences Yu.I. Maksimov (Institute of Economics and Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences, Novosibirsk).

The materials of the journal EKONOMIKA NEFTYANOY PROMYSHLENNOSTI treat urgent economic problems of the development of the oil industry.

Special sections of the journal are: improvement of the sectorial economic mechanism; the economics of enterprises; the economics of geological prospecting operations for oil and gas; the economics of drilling oil wells; the economics of oil extracting regions and development of oil deposits; the economics of transport and storage of oil and oil products; methods of mathematical economics.

Also published are materials on the status and prospects of development of the oil industry in the main oil extracting and oil refining countries of the world.

The inclusion of a number of materials in one section of the journal or another is not always unambiguous, particularly in connection with the complex approach to the problem considered in the publication.

Individual issues of the journal are devoted to many-sided analysis and discussion of urgent national economic problems. Thus, No. 10 for 1976 was devoted to the problem of acceleration and intensification of scientific and technical progress in the sector, and No. 2 for 1977 was devoted to the basic tasks of economic policy in the oil industry.

Successful development of the oil industry greatly depends on improvement of the management of the economy. One of the basic elements of the economic mechanism of management is the system of material incentives.

In 1977 introduced in the sector was a new system of formation of incentive funds.[1] Its most important element is selection of a single criterion for the goal. Such a single and ultimate goal for all collectives of oil workers is the extraction and delivery to the national economy of each ton of oil. In connection with this the contributions to the material incentive fund according to the new system of fund formation are made by means of the use of per-ton rates, so that the collectives of production associations will have a material interest in maximum utilization of the recovery capacities with the least labor outlays. It is proposed to attain such results owing to the use of increased per-ton rates of contributions to the incentive funds for an increase in the extraction of oil, and also in the per-ton rates of contributions for each percent of reduction of specific labor outlays. Since included in the make-up of the per-ton rate are contributions to the material incentive fund for the full collective of the oil-extracting association, the use of such a system of fund formation should contribute to optiumum conduct of the whole production process in the association. This should provide the conditions for rational organization of drilling operations and transport back-up--the production processes requiring the greatest labor outlays.

The transfer in the oil industry basically to a two- and three-unit system of management and conversion of production associations into the basic cost-accounting unit has made serious changes in the organization of all economic work on the "production association--production unit" level. Considered in the pages of the journal are a number of aspects of the problem of improving the planning of technico-economic indicators of the activity of production associations and production units.

As is known, at the present time in a number of sectors of the national economy during establishment of annual plans for enterprises, singled out especially are assignments regarding the issue of output corresponding to world standards. It is also planned to increase the amount of high-quality output. Taking into account the specifics of the oil extracting industry, it is proposed in the plans of enterprises to single out especially the proportion of high quality oil (group 1).[2] Of great significance for stimulating the quality of output in the oil-extracting

industry is the introduction of rebates and surcharges on the wholesale prices of enterprises for oil supplied to the oil refining plant (NPZ).

In addition, it is proposed to reflect the quality of the oil supplied and the proportion of oil of improved quality in the evaluation indicators. It is advisable to provide a material incentive for these indicators on the basis of the obtained sum of the surcharge for the quality of the oil supplied and taking into account the increased contributions for fulfillment of the plan for turning over oil of improved quality, which will provide the enterprise with an additional profit and should be included in the system of current awards.

It is necessary to note one more aspect of improving the technico-economic indicators of the activity of oil-extracting associations and enterprises, discussed in the article. Now there are rather many oil-extracting enterprises which are exploiting deposits in the late stage of their development. Since for them a saving of labor outlays is one of the basic factors of growth in labor productivity, the specific number of people working at one well of the operating fund emerges as an important indicator for evaluating the production and economic activity of the enterprise. And if its introduction in the plan does not seem self-evident, then considering the importance of lowering the specific labor outlays for release of labor resources, it is necessary to intensify the stimulating action of this indicator as one of the conditions for awarding bonuses to workers in the oil and gas extracting administrations (NGDU). However the data cited indicate that up to 1977 an improvement in the considered indicator practically provided no incentive at all. The additional amount for fulfillment of the assignment regarding reduction of specific labor outlays was contributed in the limits of 10 percent of the material incentive fund and, as a rule, comprised an insignificant sum (0.1-0.2 percent of the calculated profit). Naturally this could in no way stimulate a reduction in the specific number of people working at one well of the operating fund.

A publication by D.L. Dubrovskiy and A.A. Samsonov[3] was devoted to problems of analysis of the present status and review of the basic directions of improving cost accounting in drilling brigades. Begun in 1971 was the introduction of cost accounting in deep drilling brigades. Utilized here was the long experience of performing cost accounting in brigades for mechanical core drilling and auxiliary shops of geological prospecting expeditions of the Volga-Don Geological Administration. This system, in combination with new methods of planning and stimulating the productivity of drilling operations, with introduction of new equipment and advanced technology in drilling operations, has made it possible for all expeditions of the administration systematically to fulfill the assignments regarding profit and labor productivity.

The following basic principles were utilized during development of the method of cost accounting for deep drilling brigades:

planned for the drilling brigade, recalculated in terms of the fulfilled volume and accounted for are the expenditures which are dependent on its performance;

brigades which obtain positive results are awarded with additional bonuses from the material incentive fund according to stable norms from the saving obtained;

the normative cost according to cost accounting is coordinated with the expedition's assignment regarding profit.

As experience has shown, the introduction of cost accounting in deep drilling brigades of the Volga-Don Geological Administration has made it possible:

to stimulate growth in labor productivity (since obtaining an above-plan saving according to cost accounting in sums appreciable enough for awarding bonuses is possible only in the case of overfulfillment of the calculated plan-norm);

to increase the waves for workers in drilling brigades owing to an increase in the bonuses according to cost accounting and the the extra piece-work earnings;

to proceed to accumulation of statistical material for development and introduction of more valid norms of the expenditure of physical resources.

It is necessary to note that the problem of standardizing the expenditure of physical resources in drilling is complicated significantly by the random character of geological prospecting.

A study of the experience in introducing cost accounting in deep drilling brigades of the Volga-Don Geological Administration is interesting and effective.

As is known, dependent on the effectiveness of the utilization of circulating capital is the backing with financial resources of all processes of the production and economic activity both of individual enterprises and associations, and of the sector as a whole. An article by N.V. Kotsyuba[4] was devoted to an analysis of the status and to proposal of measures for improving the utilization of circulating capital at enterprises and organizations of the Ministry of the Oil Industry.

The Ministry of the Oil Industry has considerable circulating capital at its disposal. Also considerable are the defaulted payments for bank loans in this sector, and also payments to suppliers for materials and services. Thus, as of 1 January 1976 the defaulted payments on loans

came to 5.8 million rubles, and those to suppliers for materials and services cane to 41.3 million rubles. The untimely settlements with the banks and the suppliers are conditioned by that in a number of enterprises and organizations of the sector proper significance is not given to preservation and rational utilization of circulating capital, and the circulating capital is withdrawn for unplanned purposes. Proposed is a complex of sectorial measures, the realization of which in the very near future will contribute to an increase in the effectiveness of utilization of circulating capital at enterprises and organizations of the Ministry of the Oil Industry.

The section on "Economics of Enterprises" is one of the least impressive in the journal. It is represented by two publications, devoted to problems of analysis of the basic outlays for production in the extraction of oil and the formation of wholesale prices on casing head gas.5

It is natural that in practice there arises a multitude of urgent economic problems. And it is difficult to overestimate the effect which can be obtained as a result of exchange of experience accumulated by different enterprises in this leading sector of the national economy. Therefore an increase in the number of publications pertaining to the section "Economics of Enterprises" is, in our view, necessary.

Oil is among one of the most difficult to retrieve useful minerals. Therefore the processes of seeking and prospecting oil deposits are becoming more and more expensive and require considerable outlays of time and means. This, first of all, is connected with the broad application during search and prospecting operations for oil of deep drilling, characteristic for which is a high level of material, labor and monetary outlays. For instance, more than 500 million rubles of capital investments was spent in the course of the 9th Five-Year Plan for deep exploratory prospecting drilling in Glavtyumengeologiya [Main Tyumen' Geology Administration] (in 1975 the figure was 150 million rubles).6

It is necessary to note that modern demands regarding an increase in the economic effectiveness of geological prospecting on the basis of intensification of geological prospecting production assume the creation of a scientifically based system of control of the process of studying and preparing deposits for working. Proposed is a method of optimization of the prospecting of oil deposits, directed, on one hand, at raising the effectiveness of exploration and prospecting, and on the other at improving the quality of planning the development of oil deposits.7 The basic principle of the proposed method consists in that prospecting is regarded in a unified complex with development, and the results are compared through the economic indicators with those consequences which they can dictate in development. It is suggested to consider as optimum that level of study of the deposit at which there is minimization of the sum of outlays for prospecting and of the risk of economic losses in development.

The curve of outlays for prospecting is plotted along several points corresponding to stages in the study or arbitrary points of an extrapolated section and, reflecting the growing number of wells, is an increasing function. It is proposed to obtain the curve of the risk of economic losses in the following way. The calculation of risk is based on the possibility of a relatively worse outcome, that is on the hypothesis that some of the reserves in the amount of an error in the data compilation will not be confirmed in the future. Taking this into account the first component of risk is determined by the probable losses in prospecting per each ton of liquidated reserves as the relation of the probable cost of preparation of unconfirmed reserves to the value of the confirmed reserves. The second component of risk of economic losses is the probable estimate of specific losses in development as a consequence of a corresponding increase in the actual value of the prime cost of extraction of a ton of oil. The function of risk of economic loss in the process of prospecting is a declining one. Putting together the curves of outlays and the risk of economic losses gives in the area of the minimum of the summary curve the value of the optimum volumes of prospecting and the corresponding certainty of the reserves.

In connection with the use of methods of extrapolation, the obtained results are approximate in character. However, considered in them are the special features of prospecting and the future system of development of the considered deposit at that level of ideas which has been attained at the moment of generalization and analysis of the obtained data.

As is noted on the pages of the journal,[8] recently increasing theoretical and practical significance has been gained by such economic problems of geological prospecting as the creation of norms of indicators of the effectiveness of geological prospecting operations in different geological-economic conditions, the development of quality requirements at mineral deposits, solution of questions of the sequence of their development, the finding of the volumes of operations maximally permissible according to economic considerations or the limits of prospecting for deposits, and so on.

Necessary for solution of these urgent problems are special methods which at the present time are still little developed, particularly the methods of evaluation of deposits of oil and natural gas.

In the article the problems enumerated above received the determination of inverse (reverse) problems of the effectiveness of geological prospecting. The essence of them is that considered as given are these or other values of the indicator of effectiveness of operations and it is required to determine the geological or technological parameters of the deposits, the methods of performing the operations and so on, connected by a determined or stochastic function with a previously assigned level of effectiveness. For instance, the specific outlays for

preparation of reserves depend on the number of exploratory and prospecting wells, their cost, and also the sizes of the deposits being discovered. One of the problems is formulated in this way: what must the reserves of the deposit be in order with fixed outlays to insure a given cost of preparation of a unit of reserves.

Set forth in the work being reviewed are the principles and method of solution of a number of reverse (inverse) problems of the economics of geological prospecting. In relation to the methods set forth in the last two publications, it is expedient to make such a general remark. Geological prospecting operations at the present time are isolated in an independent sector of the national economy. However it is necessary to evaluate their effectiveness from the positions of realization of ultimate national economic goals. Coming forward as a more adequate instrument of modeling in this case are the multilevel systems of models, with the use of which an optimum solution is obtained, as a rule, as a result of realization of iteration procedures of the interaction of models of different hierarchical levels. Thus, optimization of the fuel and power complex makes it possible to estimate the rational share of oil in the country's fuel-power balance. Consideration of a sectorial system (or more accurately an intersectorial program complex), which includes the oil extracting industry, geological prospecting and the oil and gas construction industry, makes it possible to optimize the future plans of development and distribution of facilities of the oil extraction industry and, in particular, optimally to zone the geological prospecting for oil from the positions of realization of the ultimate national economic goals. It is natural that during realization of such an approach the optimization of the development and distribution of enterprises of the oil and gas construction industry, recently set aside in an independent sector of the national economy, also can be performed from national economic positions.

I would like briefly to mention two more although debatable but interesting publications, put in the section "Economics of Geological Prospecting."

The exploratory stage is of deciding significance for filling in the reserves of oil and natural gas in the complex of geological prospecting operations. The problem of revealing and preparing promising structures for deep exploratory drilling is solved as a result of the conduct of a complex of mutually complementary operations: geological surveying, structural drilling and many modifications of geophysical methods. The result of the geological surveying, and geophysical operations and structural drilling are the revealed and prepared structures, and also information on the geological structure of the site, the district, the region. In addition the structures (or sites prepared for prospecting) must be regarded as an intermediate result of geological prospecting production at the stage of exploratory operations. Suggested are two parallel systems of indicators, one of which gives an evaluation of the economic effectiveness of the method of structural drilling at the stage

of preparation of the structures, and the second can be regarded as an attempt to evaluate the transition from the geological exploration to the prospecting stage.[9] Thanks to this the results of geological exploration work (prepared structures, geological information and others) are linked with the end product of geological prospecting (with the prepared industrial reserves).

Also considered is the problem of the effectiveness of scientific research in the field of geology of oil and gas.[10] Proposed is a classification of scientific research projects in the field of geology of oil into the following types:

primary-fundamental projects (establishment of the origin of the oil, exposure of the regularities of dispersion of the beds of oil, and so on);

subject-fundamental projects (explanation of certain geological phenomena, formation of ideas about the process of formation of oil deposits, and others);

exploratory research (search for fundamentally new ways of studying geological problems of a specific oil region, the creation of bases for applied studies and scientific developments);

applied research and scientific developments (projects of a specific character, which are introduced into industrial production with an evaluation of the economic effectiveness of the results of introduction).

A method is proposed for evaluating the effectiveness of subject-fundamental and exploratory research, based on point-appraisal principles.

Let us proceed to brief consideration of the section "Economics of Drilling Operations for Oil and Gas."

It is one of the most representative in the journal. The materials placed here treat a rather broad group of current problems: from evaluation of the economic effectiveness of measures for new equipment and advanced technology with their complex utilization[11] to evaluation of the economic effectiveness of local measures directed both at improving the equipment and technology of drilling operations and at elimination of different emergency consequences.[12]

In an oil extracting region, as a rule, the development of a group of deposits is carried out simultaneously. In this case the deposits are distinguished by the status of exploitation: some are just entering industrial development, and the exploitation of others may approach the end. In addition, there are different sizes of industrial reserves, different physico-chemical properties of the collector and the bed fluids, and different geological conditions of occurrence of the productive layers.

At present the long-range plans of oil extraction are compiled primarily on the basis of planning decisions and indicators taking into account the actual state of working of the oil deposits. Such a planning procedure along with the merits also has a number of shortcomings. One of them is that applied for each deposit is one, already approved, planning variant of the plan. In connection with this the established procedure of planning does not correspond to the principles of optimum sector planning with the use of mathematical economic models, during which several variants of a plan should be considered for each of the deposits.

In addition, the plans for extraction of oil, compiled on the basis of planning decisions, do not always provide the minimum of the overall adduced expenditures for the sector as a whole, that is, they are not always optimum. Plans for oil extraction at present are compiled in three stages, and then at each stage separated from one another, at various times, based on various criteria of optimality.

A complex solution is proposed for problems of optimization of plans of oil extraction and systems of development of oil deposits.[13] First of all it is suggested to compile optimum long-range plans of development and distribution of the oil extracting industry at the level of associations with the use of dynamic models, and on this basis to set up technological schemes and plans of development of oil deposits.

It is necessary to note that the most adequate form of simulating long-range plans of the development and distribution of objects of the oil extracting industry are multilevel systems of models with realization of the effective iteration procedures of agreement of the solutions obtained at different hierarchical levels. In connection with this the proposed method of planning the extraction for an oil-extracting region[14] can be regarded only as an operational tool, insuring the receipt of preliminary results. Performed with the use of this method is the planning of the extraction of oil for the region as a whole proceeding from the actual dynamics of the development of extraction for past years and the status of the industrial reserves. In this case individual deposits and objects of development are not singled out.

Foreseen at the present time is the putting into operation of a large number of small oil deposits, for which planning documentation is lacking. Therefore especial urgency is taken on by the development of a method making it possible to determine the extractive potentials of such deposits, the periods of their development, the rates of oil extraction, and also the production capacities at the earliest possible stage of study of these deposits. The proposed method will make it possible:

to use the results of calculations both for deposits envisaged for development start-up (planning documentation for these deposits is lacking) and for deposits now being developed, for which

the calculations, without replacing existing planning documents, can supplement them substantially;

to determine the necessary indicators in the case of limitation of the volume of information for each objective;

to insure efficiency of the calculations with the least detailization (with preservation of their feasible accuracy).

Further improvement of this method will make it possible to recommend it for broad introduction during the conduct of day-to-day calculations for economic evaluation of small oil deposits.

As is known, many large oil deposits are multilayer. Establishment of optimum recoveries of oil from the recovery objectives (the bed, layer or group of layers being worked in the overall network of wells) is the most important element in selection of the rational variant of working a multilayer deposit and increasing the effectiveness of production in the sector. An effective method is proposed for optimization of the distribution of the extraction of oil in a multilayer deposit among its recovery objectives.[16] Used as a criterion of optimization is the condition of minimization for a multilayer oil deposit of the total adduced outlays with preservation of the given volumes of oil extraction. It follows to include among the undoubted merits of the proposed method the possibility of solving an inverse problem--the finding of the maximum extraction of oil for a multilayer deposit witha given isolation of the recovery objectives and limited outlays. The method has also been used for specifying the number of recovery objectives, in order to attain the planned quota with minimum adduced expenditures.

Differentiation of the plan for oil extraction a cording to the methods of exploitation of the wells is a necessary condition for evaluating the prospects of working an oil deposit. Taken into account when planning the methods of exploiting the wells are the technical possibilities and limit conditions of applicability of each of the methods. The necessity of economic substantiation of the choice of the method arises in those cases when the required parameters of exploitation of the wells can be insured not by one but by several methods of exploitation. Here it is necessary to consider that at the deposits for which a plan of development has been compiled and which are being exploited in connection with the plan, the transition from one method of exploitation of the wells to another cannot change the chosen system of their development. Determination of the limit conditions in this case should be done under the projected system of development. Set forth in an article by V.S. Karganov are principles of economic substantiation of the selection of the method of exploitation of wells, making it possible to connect the solution of this problem directly with planning the extraction of oil.[17]

An essential reserve of an increase in the extraction of oil and a rise in the yield on capital in the oil industry is an improvement in the use of the operating fund of wells, which is evaluated by the coefficient of exploitation.[18] The proposed system of planning the coefficient of exploitation of wells, considering a number of the consequences of the transition of the oil industry in 1970 to the new system of organization of production and management, makes it possible to increase the interest of enterprises in its fulfillment and overfulfillment and thereby to contribute to an increase in the extraction of oil and an increase in the capital-return of the wells. For instance, just during 1975 for the Dolinaneftegaz Oil and Gas Extracting Administration (NGDU) an additional 16,700 tons of oil was extracted owing to an increase in the coefficient of exploitation of the wells.

The problem of improving the method of determining the economic effectiveness of full working of oil deposits is very urgent in connection with the objective difficulties of replenishing the reserves of oil.[19] At the late stage of exploitation of oil deposits it is necessary to plan such systems of their development which would be able to slow down the rates of reducing the extraction of oil and reducing the technico-economic indicators. Naturally, the final decision about the degree of working an oil deposit should be made on the basis of a national economic evaluation of the effectiveness of the proposed variants.

As is known the oil extracting industry is located in regions with industrial reserves of oil that are adequate for stable extraction of it over the duration of an extended period of time. And, as a rule, it is necessary to supply the oil from the points of extraction to the regions of processing and dispatch for export. A number of specific features of pipeline transport substantially affect the solution of the overall task--that of optimization of the development and distribution of facilities of the oil extracting and oil refining industries.

The materials contained in the section "Economics of transport and storage of oil and oil products" are devoted to analysis and discussion of a rather broad group of urgent problems: from forecasting the tendencies of development of the system of trunk oil pipelines[20] and development of the oil pipeline systems of Western Siberia[21] to description of the method of optimization of the plan of distribution of capital investments during construction of several trunk oil pipelines[22] and consideration of the economic aspect of selection of the optimum thickness of heat insulation for above-ground reservoirs.[23]

As a general shortcoming peculiar to a number of the publications included in the section on "Economics of transport and storage of oil and oil products" one can note the absence during resolution of specific problems of planning of coordination of the process of transporting oil with the processes of prospecting for it and extracting it.

Of course, in a brief survey it is impossible to consider all the interesting publications contained in recent issues of EKONOMIKA NEFTYANOY PROMYSHLENNOSTI.

The significance of this publication goes beyond the framework of the sector: both certain theoretical studies and the results of the practical experience can be used in other extractive sectors of the national economy.

FOOTNOTES

1. "Tasks of Economic Services of the Sector in 1977," 1977, No 1, pp 3-5.

2. Zemlyanskaya, V.I., Kryukova, G.F., "On the Question of Improvement of Planned Technico-economic and Evaluation Indicators of the Performance of Associations and Production Units," 1976, No 8, pp 7-9.

3. Dubrovskiy, D.L., Samsonova, A.A., "On Cost Accounting in Drilling Brigades," 1976, No 7, pp 3-7.

4. Kotsyuba, N.V., "On the Status and Measures for Improvement of the Use of Circulating Capital at Enterprises and Organizations of the Ministry of the Oil Industry," 1976, No 8, pp 3-6.

5. Valikhanova, A.M., "Analysis of Basic Expenditures for Production in Oil Extraction at the Al'met'yevneft' Oil and Gas Extracting Administration," 1976, No 1, pp 7-10.

   Vasil'yeva, V.K., Kosinov, N.N., Kuz'min, A.Z., "Certain Questions of the Formation of Wholesale Prices for Petroleum Gas," 1976, No 2, pp 7-9.

6. Kozorezov, A.A., Posrednikov, V.K., "On Certain Results of Deep Exploratory-Prospecting Drilling for Oil and Gas in Tyumenskaya Oblast," 1976, No 11, pp 3-6.

7. Yegorov, R.A., Fursov, A.Ya, Taldykin, K.S., Safronov, S.V., Amerika, L.D., "Method of Geological Economic Substantion of Rational Prospecting on the Basis of its Optimization," 1976, No 3, pp 8-13.

8. Leybson, M.G., "On the Method of Calculation of Norms of Indicators of the Effectiveness of Geological Prospecting," 1976, No 2, pp 9-13.

9. Borisov, A.I., "Evaluation of the Economic Effectiveness of the Exploratory Stage of Geological Prospecting for Oil and Gas," 1976, No 7, pp 15-19.

10. Khalmov, E.M., Belova, A.A., Grigor'yeva, V.P., "Toward Evaluation of the Effectiveness of Scientific Research in the Field of the Geology of Oil and Gas," 1976, No 2, pp 13-16.

11. Lazaryan, B.S., "Economic Effectiveness of Individual Measures Regarding New Equipment and Advanced Technology in the Case of Their Combined Utilization," 1976, No 8, pp 10-16.

12. Kalustov, G.D., Katenev, Ye.P., Khannanov, R.N., "Economic Effectiveness of the Use of the L-7 Heat- and Salt-Resistant Reagent for Regulating the Properties of Cement Slurries," 1976, No 12, pp 5-7.

Shein, V.A., "Economic Effectiveness of the Use of the ULP-190-1 Device For Elimination of Blockings of Drilling Pipes," 1976, No 1, pp 14-17.

13. Fattakhov, V.Z., "Method of Optimization of Long-Range Plans of Development and Distribution of the Oil Extracting Industry on the Level of Associations with the Use of Dynamic Models," 1976, No 5, pp 20-25.

14. Sattarov, M.M., Suchkova, L.I., Selitskiy, A.G., "Certain Features of Planning Extraction for an Oil Extracting Region," 1977, No 3, pp 16-21.

15. Rokhlin, S.M., Rybak, A.B., Umanskiy, M.M., "Method of Forecasting Extractive Potentials and Production Capacities of an Oil Deposit on the Basis of Limited Information," 1976, No 4, pp 24-27.

16. Nesterova, N.Ye., Nikolayevskiy, N.M., Orlov, V.S., Ryzhenkov, I.I., "On a Method of Determining the Optimum Recoveries of Oil for Recovery Objectives of a Multilayer Deposit," 1976, No 7, pp 19-26.

17. Karganov, V.S., "On the Question of Economic Substantiation of the Methods of Exploitation of Wells at Operating Deposits During Long-Range Planning," 1976, No 12, pp 9-12.

18. Lesyuk, V.S., Turko, M.I., Dyriv, V.F., "On Improving the Planning of the Coefficient of Exploitation of Wells," 1976, No 8, pp 28-30.

19. Klyazhnikova, D.P., Ryzhenkova, I.I., "For a Method of Determining the Economic Effectiveness of Additional Working of Oil Deposits," 1976, No 9, pp 13-16.

20. Dubinskiy, V.G., "Certain Tendencies in Development of the System of Trunk Oil Pipelines for the Future," 1976, No 11, pp 30-33.

21. Savitskiy, V.B., "Economic Problems of Development of Oil Pipeline Systems of Western Siberia," 1976, No 9, pp 37-40.

22. Galeyev, V.B., Bikkulova, R.N., "On the Question of Optimization of the Plan for Distribution of Capital Investments During Construction of Several Trunk Oil Pipelines," 1976, No 12, pp 26-28.

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FUELS AND RELATED EQUIPMENT

MINISTER MAL'TSEV DISCUSSES COMPUTERS IN OIL INDUSTRY

Moscow EKONOMICHESKAYA GAZETA in Russian No 32 Aug 78 p 15

[Article by N.A. Mal'tsev, USSR Minister of the Oil Industry: "From the Fields to the Ministry"]

[Text] We are continuing publication of articles from materials of the second All-Union Conference on the Use of Computers and Automated Control System in the National Economy (previous articles were published in Nos. 22, 23, 24, 25, 26, 29 and 31).

Management of such a sector as the oil industry presents itsel as a complex task. The basic directions of production--prospecting of deposits, drilling of wells and extraction of oil--are being developed, as a rule, under exceptionally complex natural and climatic conditions, the oil fields lag far behind the industrial centers and do not have sufficiently developed transport communications.

All this predetermines the necessity of extensive appliation of electronic computers in management of the sector. Automated control systems with the use of electronic computers are being set up at all levels of management and in all types of production. Comprising the basis of the control system is the sectorial automated control system (OASU; otraslevaya avtomatizirovannaya sistema upravleniya), headquartered at the Main Information Computer Center of the ministry in Moscow.

The Main Information Computer Center has a ramified network of terminals, that is devices for data input and output, located in the oil regions. The terminals are located in multiple-user computer centers of oil and gas extracting associations and in the computer centers of administrations of trunk oil pipelines. The majority of terminals and, consequently, also of computer centers, located in the oil regions are connected with the Main Computer Center by communications channels ensuring high quality of information transmission.

Operating in the OASU is an automated system of planning calculations, a system of collection of operational data on all directions of activity, a system for control and analysis of the status of oil deliveries and a number of other complexes.

Trends of Development of the Computer Centers

The 58 computer centers in the sector are divided according to designation into four groups. These are the miltiple-user centers of the oil and gas extracting associations serving enterprises for extracting of oil, drilling of wells and processing of gas, the computer centers of geophysical trusts, computer centers of administrations of trunk transport of oil and the computer centers of planning and scientific research institutions.

Such a structure is caused by that the types of production existing in the sector differ sharply from one another. Thus, whereas the extraction of oil, processing of gas and pipeline transport have continuous production, the prospecting of deposits has the character of discrete production.

Seventeen multiple-user computer centers of the oil and gas extracting associations are connected by terminals with the Main Computer Center of the OASU and in turn they have terminals for link-up with drilling, oil-extracting and auxiliary enterprises of the association. Besides the collection and processing of data for the operation of the association's automated control system, the multiple-user computer centers make calculations and solve problems for the automated control systems of the enterprises. Switched in to the multiple-user computer centers are also nearby gas-processing plants which are not part of the system of the association.

The greatest volume of operations for creation of automated control systems was performed in the sector at enterprises for extraction of oil. Fully automated here is the management of 188 out of 320 oil fields with the total volume of oil extraction at 414 million tons per year.

I would like to note that the technological processes of lifting oil to the surface, collection, and bringing it to commercial conditions are simple enough and do not require direct control using electronic computers. However, under the conditions of great dispersal of facilities, of a small staff, growing immeasurably is the role of correct organization of production, of optimum didtribution of material and technical, and manpower resources. These tasks are also solved in the framework of the automated control systems of enterprises for oil extraction along with calculations of optimum regimes of operation of equipment under the constantly changing operating conditions of the oil field.

All the dispersed facilities are remote controlled. Information on the operation of the wells, the measuring and separation units and pumping

stations comes to the control centers of the oil fields, which transmit this information to the data center of the enterprise and to the multiple-user computer center. On the basis of this information the report and accounting documents are drawn up and the questions of selection of the technological regimes and organization of systems for maintaining them are decided.

Automated control systems created in oil extraction are highly efficient. Overall automation makes it possible to insure operation of the significantly growing fund of wells without an increase in the number of workers. As a result, for instance, saved in the Ninth Five-Year Plan was the labor of about 12,000 people on the industrial-production staff.

However, the efficiency of the systems could be greater. One of the obstacles is the inadequate outfitting of the enterprises of the sector with terminal equipment. In many cases the subscriber points of the oil fields and oil extracting enterprises operate with the use of teletype machines, which leads to errors in transmission and unwarranted interference.

The system of control of well drilling so far is considerably inferior to the system of control of oil extraction. In many ways this is because despite the presence of many developments of means of automation and control for drilling, in the country the industrial output of the necessary apparatus has not been organized and the drilling installations are not outfitted with the necessary set of pickups and actuating mechanisms. Also not being put out are systems of telemetric control, which would serve as the technical basis of automatic control systems for drilling operations.

The automated system which operates in geophysical organizations performing prospecting is in essence closer to a system of automation of research than to a control system. The fact is that the latest methods of geophysical operations, seismic and logging, require compulsory use of electronic computers as a processor and interpreter of data. These methods increase many-fold the resolution capacity of the research, the reliability of the processing results and as a result yield a considerable benefit.

Organizations of the Ministry of the Oil Industry have developed new seismic stations, based on digital recording, and processing systems on the basis of domestic second and third generation electronic computers. Also developed were new sources of generating oscillations for these stations. The produced models of seismic prospecting equipment have been tested under field conditions on known structures and good results have been obtained.

Recently worked out and adopted was a program of joint actions of the Ministry of the Oil Industry, the USSR Ministry of Geology and the USSR Academy of Sciences for production of new means for geophysical prospecting.

The decision about equipping geophysicists with modern techniques using electronic computers is fundamentally important not only for prospecting, but also for field geophysical studies, insuring determination of the position of the water-oil contact, the site of the flow and the absorption of liquid, the composition of the liquid in the well and other parameters of control over the conduct of development of the deposits, and also for creating the base of reliable information which is necessary for drilling the wells.

Considering Concentration of Capacities

In trunk transport of oil the systems of control are distinguished from systems of control in oil extraction and drilling of wells. Here, under the conditions of a considerable extent of the oil pipelines, large capacities are concentrated at the transfer pumping stations. The pumping regimes are subject to considerable fluctuations, in connection with which there arises the problem of direct control using an electronic computer.

The technical basis of the control systems is the TM-120 remote control system, which is comprised of a controlling computer complex, operating on the basis of SM series machines. Such a system gathers data and controls facilities of the oil pipeline extending up to 1,000 kilometers with 10-15 pumping stations and reservoir parks. Put into operation last year was the first phase of an ASUTP [possibly, automated control system of the fuel industry] of the Druzhba oil pipeline on the Mozyr'-Brody-Uzhgorod section. This system was planned and erected jointly with the Institute of Cybernetics of the Ukrainian SSR Academy of Sciences, which is responsible for developing the system's software.

The systems erected on individual sections of the oil pipeline form a common automated control system by means of joining with the computer center for control of the whole trunk oil pipeline.

The computer center for control of the oil pipeline is linked through the terminal with the Main Information Computer Center of the ministry and in this way coming into the sector automated control system is complete information about the status of the pumping, the amounts of the inflow of oil from the oil fields and the deliveries of oil to all the consumers through the pipelines, by railroad and by water transport. The presence of such a system in the sector made it possible to maintain maximum loading of all pipelines. Despite the annual increases in the extraction of oil, it was possible to reduce the hauling of oil by railroad transport, which is especially important considering the loading of the railraods.

One more important result of the automated system of control of oil transport is the significant lowering of the outlays of electric power owing to pumping in optimum regimes. In 1977 saved in this way was 449 million kilowatt-hours of electric power, which corresponds to 3.6 million rubles of savings in operating expenses.

The main task in development of the automated control system for oil pipeline transport should be considered to be a further increase in the volumes of remote control of the pipelines. So far these operations are being held up due to the inadequate delivery of remote control systems by the Ministry of the Instrument Building Industry. At the same time there should be development of outfitting the rayon oil pipeline administrations with terminal devices for work with the computer center for the administration of trunk oil pipelines.

Systems of Automated Planning

The last group of computer centers is the 23 computer centers of planning and scientific-research organizations. These centers, up to now performing individual engineering calculations, at present are transferring to work under the conditions of the system of automated planning.

Set up in the sector are three systems of automated planning: a system of planning the development of deposits, one for planning the construction of wells, and one for planning the setting up of deposits. The first results of the work show their high effectiveness: reduced 2-3-fold are the times for making up the plans, there is an improvement in the quality of the operations in connection with unification of the methods and programs of planning, and the labor productivity of the planners is increased by 15-30 percent. These operations are extremely important for the sector. Certainly the number of deposits increases constantly, and there is an increase in the volumes of capital investments and correspondingly in the volumes of planning jobs.

An improvement in the quality of planning yields a great economic benefit. During planning of the set-up of three deposits in Tyumenskaya Oblast with the use of optimization programs for locating clusters of wells, roads, electric supply lines and complex prefabricated centers there was a saving of 22.6 million rubles.

Further possibilities of a significant increase in the effectiveness of the use of automated control systems and computer equipment are connected with an increase in the optimization tasks in exploitation of oil fields and pipelines, with the use of very high speed electronic computers for prospecting of new deposits, with the creation of automated systems of planning the development of deposits, construction of wells and organization of oil extracting enterprises.

For the purpose of a further increase in the level of operations for automation and automated control systems created in 1977 in the apparatus of the ministry was a special administration for automation, which was given the responsibility of organizing the development and realization of complex target programs for development of automated control systems at all levels of management and in all types of production.

The program of operations up to 1985 provides for the development of operating and the creation of new automated control systems at all oil and gas extracting enterprises, in all administrations of trunk oil pipelines and at drilling enterprises. According to the calculation of specialists, fulfillment of this program in the future will make it possible to insure additional extraction of oil in an amount of not less than 10 million tons per year, and to reduce the number of industrial-production personnel.

10908
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SIBERIAN FUEL BASE DEVELOPMENT SHOWN

Moscow OGONEK in Russian No 27, Jul 78 pp 10-11

[Article by Yu. Bokserman, deputy chairman of the State Expert Commission of USSR Gosplan: "In Siberia After the Heat..."]

> [Text] In a total of 10 years we have converted this taiga territory into the chief oil base of the country. Now a powerful gas and chemical industry is being unfolded there. No longer characteristic of the landscape of Tyumenskaya Oblast are trees and deer tracks, but rather young cities, oil and gas fields, plants, railroads and main highways. And they are of such scale! Just think, comrades: being economically developed and settled on the Ob' is a territory of one million square kilometers. This is approxmiately the area of Spain, Italy and England taken together.
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> From a speech by L.I. Brezhnev to the 18th session of the All-Union Lenin Young Communist League

Siberia and the Far East... A gigantic territory, exceeding more than 1.5-fold the whole area of Europe, the region about which Radishchev said: "What a rich territory is this Siberia, what a mighty territory! It will still take centuries, but when it is populated it is destined to play a large role in the annals of the world."

Centuries, perhaps, but necessary were Soviet power and the will of the party, of our people, in order to create the very large national economic complexes in the eastern regions, to develop here deposits of minerals, to include them in the overall economic potential of the country.

The Soviet people are happy for the successes of the toilers of Siberia and the Far East, by whose hands were created the Western Siberian,

Angara-Yenisey, Bratsk-Ust'-Ilimsk, Irkutsk and Krasnoyarsk territorial-production complexes. Still another complex is being formed--the Southern Yakutsk. Being erected are large hydro-plants, combines and the Baikal-Amur Trunk Line, known far beyond the borders of our homeland. Even in 1980 the share of Siberia and the Far East in the all-union production of the most important types of output will come to: oil (including gas condensate)--50 percent, natural gas and coal--40, wood, paper and cardboard--30, and electric power--20 percent.

Last year the State Expert Commission of USSR Gosplan reviewed the general scheme of development of the country's national economy for the coming years, developed by the Council for Study of Productive Forces, about which the chairman of the council, academician N.N. Nekrasov, told in detail. The especial attention of outstanding scientists was attracted by the prospects of the eastern regions with deposits of minerals which are located a comparatively short distance from one another, and therefore it is possible and necessary to solve the problem of their complex utilization.

Especial interest was aroused by the potentials of Western Siberia, the rapid development of which was told about at the 18th Congress of the Komsomol by comrade L.I. Brezhnev.

In April the oil men reported on the extraction of the first billion tons of oil since the start of development of the Western Siberian deposits. This was attained in a short period of industrial development of the deposits opened by geologists as a result of persistent searches.

It is always difficult for the discoverers. But it was especially difficult for the one who "revealed" the Siberian storehouses of underground riches. Nowhere, certainly, are there such incredibly complex natural and climatic conditions as on the Tyumen' territory. I was convinced of this myself when 15 years ago together with a group of specialists I arrived in Ust'-Balyk on the Ob'.

At that time here in the thick taiga the first gushers of oil were struck, and the discoverers Yu.G. Erv'ye and F.K. Salmanov showed us with joy and pride how the oil was "pumped" into the tank through the pipeline from the exploratory wells. Around there were several wooden cottages, thick beams and no roads. The closest city, Surgut, was linked with Tyumen' only by river. But nevertheless the first to cross were optimistic.

In 1964 the first 200,000 tons of oil arrived at the Omsk oil refinery. This, indeed, is little. Now the goal has been set of attaining a volume of 315 million tons of oil extraction in 1980. Of course this in no way lessens the feat of the first discoverers. I write about this because recently in an essay about Tyumen' one of the writers, referring to the information of a venerable scientist, reported to the readers

that the discovery of gas in Berezovo did not bring any benefit, and moreover diverted the geologists from the main direction of the searches. This had to be invented! Namely the gusher of Berezovo gas attracted the attention of planning and economic organizations, which allocated means for intensifying geological prospecting. Opened soon near Berezovo was the Pugino gas deposit, and the first gas pipeline was built in the Urals. Excellent fuel was received by Sverdlovsk, Serov, Nizhnyy Tagil, Chelyabinsk, and metallurgical and machine building plants. All this even then yielded a huge saving.

In the last year of the Tenth Five-Year Plan the country will receive 125-155 cubic meters of gas from Western Siberia.

Almost the whole increase in oil and gas in the country for the long-term future will be provided by Western Siberia. Searches for new deposits are continuing in both Western and Eastern Siberia. The searches are going on energetically, in a broad front, for the needs of the national economy for fuel and raw material for chemistry are increasing with every year. Of late in the American press fabrications about our fuel industry have begun to appear with increasing frequency. Their authors give out the desired for the actual, and it is necessary to recall for them the wise words of the ancient Greek orator, Socrates: "If someone speaks unkindly about you, first of all direct attention to how he himself orders his affairs." And how their "own affairs" are organized in the United States can be judged according to the "State of the Union" address by President J. Carter to the Congress in January of this year: "Every day we spend over 120 million dollars on buying foreign oil. This reduces the rates of our economic growth, it lowers the value of the dollar abroad and leads to further growth of unemployment and runaway inflation in our own country." Further the President affirms: "Nowhere can we escape the fact that in connection with the energy legislation we have not justified the hopes of the American people."

...After the second world war the extraction of oil in the USSR fell almost to 22 million tons and came only to 8 percent of the United States level. In 30 years it has reached almost 520 million tons and the USSR, having caught up with the United States, occupied first place in the world in oil extraction.

Our country will increase its fuel and energy potential, it will continue actively to prospect for new deposits of oil and gas, to develop the very rich deposits of coal in the Kansk-Achinsk basin, to develop atomic power in every way, and to develop new types of energy. And with all this the Soviet people have taken to heart the appeal of the party about the necessity of economical expenditure of fuel and electric power, about rational and full utilization of natural resources.

The conditions of Western Siberia--the taiga and tundra, permafrost, impassable swamps--have required a search for new technical solutions,

for the traditional methods applied in other regions have proven here to be inapplicable, expensive and very time consuming. Put into action were the lastest equipment and technology. "And much has been attained here," stressed L.I. Brezhnev in his speech to the 18th Congress of the Komsomol. Mentioned as an example was the block method of construction.

What is the essence of it? At the oil and gas fields, at oil pipelines and gas pipelines it is necessary to erect many pumping and compressor stations, boiler rooms, workshops and apartment buildings. But there are no roads to them, and it is very complicated to deliver the materials and equipment. What is to be done? Well known in the oil industry is the experience of introducing at oil fields of Tataria the progressive designs of block equipment, developed by a group of innovators under the leadership of V.D. Shashin. In Tyumen' the creative organizers of block construction of oil field facilities were the leaders of the main administration, V.I. Muravlenko and V.Yu. Filanovskiy. The Tyumen' builders of the Ministry of Construction for the Oil and Gas Industry engineers Yu.P. Batalin, A.S. Barsukov, I.A. Shapovalov and M.S. Royter developed and widely introduced the block method, which not only accelerated the construction many-fold, but also provided a significant saving of money and metal. All the equipment for the oil fields and pipelines is assembled at the plant in individual blocks. They are delivered to the construction site and installed there. Usually the equipment arrives here "in bulk," and much time and labor is expended to assemble it. And there is still another advantage--the area of the construction project is reduced considerably.

The soul of this whole new business was the oblast committee of the party and its first secretary B.Ye. Shcherbin, who is now continuing, even as minister of construction of enterprises of the oil and gas industry, actively to introduce the block method at all construction projects of the country.

I will cite one more example of speedy construction. This concerns the erection by organizations of the Ministry of Construction of Oil and Gas Industry Enterprises of a new high-capacity gas pipeline along a very complicated route from the Vyngapur and Urengoy deposits to the Urals through Surgut. Its length is 1,500 kilometers, but 1,000 of these pass through swamps, taiga, and flooded sections. Usually such gas pipelines are built in three years--in any case two winters were required when the swamps were frozen. But the new gas pipeline in Chelyabinsk was built three-fold faster than the established norms. This has never occurred before in our practice.

Introduced for the construction of the gas pipeline was a welding complex, developed by the Institute of Electrowelding imeni Ye.O. Paton jointly with organizations of the Ministry for Construction of Oil and Gas Industry Enterprises. The assembly, told about in OGONEK, moves

forward inside the pipes and welds them in 7-8 minutes. The productivity of the complex per day is 40-50 joints, and for the best welder it is one joint. At this construction the competition of brigades and sections was very well organized. The results pleased everyone: the trunk gas pipeline was built in half a year under severe natural conditions. This example will have far-reaching consequences. I cannot help but address myself to the construction of the oil pipeline from Alaska. Its length is 1,300 kilometers, the diameter of the pipes is less than for the Tyumen' line, and it was built in 8 years. And when it was built, for a long time they could not set up the operation.

At the end of last year the American magazine NATIONAL GEOGRAPHIC wrote about the construction of this oil pipeline and about the development of Alaska: "It seemed that Alaska's share in the oil boom--the income from rent and allocations--would serve to help the state flourish. They dreamed about schools, hospitals, airports and roads, about a better life after so many years of being stuck in cabins. None of this happened. The cabins and the out-of-the-way places have remained..."

The spheres of activity of the oil men and the gas workers were divided by nature itself: in the regions of the Northern Ob' there is oil, and to the north of Tyumenskaya Oblast, including beyond the Arctic Circle there is gas. Large gas deposits have been found there.

Even very recently little was known about the gas deposits: Medvezh'ye, Urengoy, Kharasave on the Yamal'skiy peninsula. Previously it was possible to get to them only by airplanes and helicopters, or by river. Now the builders of the Ministry of Construction of Oil and Gas Industry Enterprises have restored the section of the so-called "dead road," and the train from Nadym has gone to Urengoy, and construction detachments of the Ministry of Transportation Construction are coming from the south, laying the Surgut-Urengoy railroad through the taiga.

This is what V.T. Podshibyakin, Lenin Prize winner, and one of the discoverers of Urengoy said about it:

"Neither with respect to reserves of raw material, nor with respect to geological structure have we ever come across such rich storehouses of nature. The Urengoy deposit reminds one of a puff pastry. The geologists have studied only its crust..."

A puff pastry--this means many layers, the deepest of which are at a depth of up to 3,500 meters. In them is not only gas, but also a very valuable raw material for chemistry--condensate.

In May of this year here an oil field built in a very short time began to operate, and Tyumen' gas was supplied through pipelines to the central regions of the country.

Begun in 1978 was ahead-of-schedule assimilation by gas workers of the Medvezh'ye field at full planned capacity, a field at which they are now extracting 65 billion cubic meters of gas per year--just as much gas as was extracted 15 years ago in the whole country. The association of Tyumengazprom and the builders of the Ministry of Construction of Oil and Gas Industry Enterprises for the first time in world and domestic practice built the field under severe natural conditions, in a region of permafrost, and they worked out and incorporated new technical solutions, saving in this away hundreds of millions of rubles.

Uitlization of the advances of science and technology for further development of the eastern regions is at the center of attention of many scientists. Recently at a conference in USSR Gosplan, academician G.I. Marchuk, chairman of the Siberian Department of the USSR Academy of Sciences, told about development of the long-term program "Complex Development of the Natural Resources of Siberia," called "Siberia" for short. In it are the problems of complex utilization of mineral-raw material, land, forest and water resources, the problems of the social and economic development of the territory. Realization of the vast plan of projects will be accomplished in close contact with industrial enterprises, with higher educational institutions. Actively participating in solution of the complicated problems of complex development of the eastern regions are also other institutes of the USSR Academy of Sciences, and the Academy of Sciences of the Ukraine.

The new, more complex stage of development of the Western Siberian region is connected with further growth in the extraction of oil and gas, with the creation of large petrochemical and energy complexes directly alongside the open deposits. "On this account there are different views--from the extremely pessimistic to extremely optimistic," it was written recently in the journal OKTYABR' by the first secretary of the Tyumenskaya Oblast Committee of the CPSU, a geologist, and one of the discoverers of the oil riches, G.P. Bogomyakov. "It would have been useless to set great hopes on that as there is successful solution of the tasks set by the party before the new region the difficulties which it is necessary to overcome will be reduced, and then even come to nothing. The Tyumen' complex cannot be regarded as something that has been given once and for all. Life itself, the headlong rush of time, the demands of the era of developed socialism will introduce new nuances into its development, they will make their own adjustments."

The toilers of Western Siberia are prepared to solve the more complex tasks dictated by time. It is becoming more and more difficult to seek out new deposits. It is necessary to drill the exploratory wells to a great depth. But mainly it is necessary to build many expensive trunk gas pipelines and oil lines with a length of 3,000-4,000 kilometers

each, from Western Siberia to the European part of the country and to the Urals, where three-fourths of the population of the Soviet Union lives and where about four-fifths of the total industrial output of the USSR is produced.

The Soviet people are proud of the successes of Western and Eastern Siberia, the toilers of which are being assisted by the whole country. The geologists are continuing the search for new deposits of minerals, they are building cities and plants. The mighty territory is advancing with giant strides into a bright future...

10908
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ISAYEV DISCUSSES KAZAKHSTAN COAL INDUSTRY PROBLEMS

Moscow EKONOMICHESKAYA GAZETA in Russian No 32 Aug 78 p 5

[Article by B.V. Isayev, first secretary of the Pavlodarskaya Oblast Committee of the Communist Party of Kazakhstan: "Turning Toward the Complex"]

[Text] Pavlodarskaya Oblast is a territory that is rugged, but rich in minerals. In the last decade here the volume of industrial production has increased more than 24-fold. Envisaged by the decisions of the 25th CPSU Congress is further development of one of the country's largest complexes, the Pavlodar-Ekibastuz territorial-production complex.

There should be a sharp change in the economic appearance of the oblast. The total capacity of coal extraction at the Ekibastuz and next-door Maykubenskoye deposits in the future will be brought up to 170 million tons per year.

It is necessary to erect five very large heat and electric power plants with a capacity of 20 million kilowatts, to build electric power lines extending sereral thousand kilometers, to lay 1,170 kilometers of railroad lines and to erect many projects.

Under Strict Party Control

Taking part in the erection of the Pavlodar-Ekibastuz territorial-production complex are scores of ministries, departments, scientific research and planning institutes and other organizations. Coordinating their efforts is a complex task, requiring the combination of sector and territorial principles of planning and management. The oblast party organization is striving to have rational joint decisions made about the most important problems. It is possible to cite many instances when coordinated actions helped correctly and rapidly to solve complex problems.

Extensive and coordinated work, for instance, was done by all participants in creation of a complex for expanding the production base in Ekibastuz

and strengthening the construction organiz tions. As a result the e appeared the large Ekibastuzenergostroy Trust of the USSR Ministry of Power, where more than 6,000 builders are already at work. The USSR Ministry of the Coal Industry has strengthened its Ekibastuzshakhstroy [Ekibastuz Mine Building] Construction Combine.

In order to strengthen the construction organizations, sent from Pavlodar and other cities of the republic are experienced cadres of specialists, which makes it possible rapidly to increase the volumes and rates of operations. While last year the Ekibastuzenergostroy Trust performed construction and installation work worth 45 million rubles, this year its program comes to about 73 million.

Unanswered for some time has been the question of where and how to build and develop housing projects: alongside each new GRES or in the already existing city of Ekibastuz. There was no unified opinion. The question was studied thoroughly by the party oblast committee and the conclusion was to build a modern city in the region of the existing city and to deliver the workers to their place of work at the GRES by high-speed electric trains.

The appropriate ministries and departments, allocating means for industrial construction, are now contributing a certain share also to development of the city. Ekibastuz is being built up, taking into account modern demands which, of course, could not be attained in the case of construction of small settlements. Only the USSR Ministry of the Coal Industry, for instance, planned to build a cultural center to accomodate 1,000 people, a stadium, sports complex, hothouse combine and other facilities.

Also effective were the joint efforts aimed at development of socialist competition. Confirmation of this is the joint resolution of the Bureau of the Central Committee of the All-Union Lenin Young Communist League and the collegiums of the ministries of power and electrification of the USSR, and of the coal industry of the USSR about the participation of komsomol organizations in creation and development of Ekibastuz the Ekibastuz fuel and power complex. There was an increase in the influx of young people to the construction site, and their labor activity has been greater.

It is possible to mention many other examples of this type. But certain questions of coordination of the activity of numerous organizations still remain unsolved. Here is one of them. The construction of housing in the region of the fuel and power complex was made the responsibility of a general client--the USSR Ministry of the Coal Industry, and in particular the Ekibastuzugol' Association. However, up to now the USSR Ministry of Power has not granted the appropriate means to the USSR Ministry of the Coal Industry.

What must be done so that such phenomena will not occur? We see the answer to this question in the words of Comrade L.I. Brezhnev, spoken by him at the 25th CPSU Congress: "...The question has come to a head about improving the methods of complex solution of large-scale statewide intersectorial and territorial problems. Required here are unified, centralized programs, covering all stages of the work--from planning to practical realization."

The party organization of the oblast imparts especial attention to fulfillment of the program for creation of the complex. Certainly the lag regarding some positions or others can lead to disproportions in development of the complex as, for instance, has happened here regarding oil refining. The first phase of the Pavlodar Oil Refinery should have gone into operation last year. But, despite assimilation of the means allocated, the start-up did not take place. The client was not fully supplied with equipment, they were short 7 million rubles for completion of the jobs. As a result the oil arrived along the oil pipeline from Omsk to Pavlodar, but the refinery was not ready to process it.

This year the construction project was taken under the special control of the party oblast committee. The state of affairs was discussed at the bureau of the oblast committee, and measures were taken to create conditions for highly productive work of the builders. The result of all this was that the enterprise was put into operation in the first half of the year.

The problems of creating the Ekibastuz fuel and power complex are being discussed at plenums of the oblast committee, the bureau, and meetings of the party aktiv of the Ekibastuz, Pavlodar and Yermakov city committees of the party, and the Ekibastuzskiy and Bayanaul'skiy rayon committees of the party. Working on the complex is a permanent commission of the party oblast committee, which reviews especially important questions of construction every month.

When, for instance, difficulties were revealed regarding bringing the workers to the construction sites, following a proposal by the commission a new motor bus fleet was created. The problem was solved. And when last year the Ekibastuzenergostroy Trust began to lag in fulfilling the plan for housing construction, the problem was reviewed at the bureau of the Ekibastuz city committee of the party. Help was given to the trust in the form of cadres and mechanisms. As a result the annual plan was overfulfilled.

Multiply the Labor Traditions

One of the central sectors of the work of the oblast party organization ducing creation of the complex is the formation of new collectives. The enterprise at the complex is being built according to the last word

in engineering and it is completely understandable that it should be managed by highly skilled specialists. This means that target-oriented work is needed for training and retraining of cadres. We, in particular, are training a significant share of the engineering and technical personnel here in the oblast.

The Pavlodar Industrial Institute annually graduates 900-950 young specialists--power engineers, builders and machine builders. The Ekibastuz Mining Tekhnikum and two vocational and technical schools, which are under the jurisdiction of the Ekibastuzugol' production association and the Ekibastuzshakhtostroy combine, train excavator operators, mine surveyors and builders in many specialties. Every year 500-550 people are graduated here. Simultaneously with ex ansion of GRES-1, the Ekibastuzugol' trust set up an instructional combine where, without leave from work, almost 800 people have already gone through training in building specialties.

Extensive training of cadres is done directly at the enterprises. Primary attention here is directed to the training of young workers using the experience of the best. We are striving to have the glorious labor traditions be instilled and developed in the young collectives also. Good experience has already been accumulated, for instance, by the Pavlodar Aluminum Plant. For the results of last year it was awarded the challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Trade Unions and the Central Committee of the All-Union Lenin Young Communist League and was inscribed on the Board of Honor at the USSR All-Union Exhibition of National Economic Achievements. Being waged here in an intersting way is the struggle for improving product quality. It is enough to say that the plant is putting out about 90 percent of its products with the Seal of Quality.

We are disseminating widely the advanced know-how of the collective of the aluminum plant: we are sending the best people of this plant to work at other enterprises. Not long ago the deputy directory of the plant, S. Berketov, was appointed manager of one of the new enterprises where in a short time with his help many effective forms of labor organization were introduced.

Under the conditions of accelerated renovation of fixed production capital, acutely facing us is the problem of the fastest assimilation of capacities. Indeed, every year more and more new large enterprises or shops are being put into operation.

In two and a half years of the five-year plan the builders in the oblast performed the construction and installation operations worth more than 500 million rubles. Made operational were four electrosmelting furnaces for production of 200,000 tons of ferrosilicon per year at the Yermakov ferroalloy plant, capacities for smelting 25,000 tons of steel castings and production of 32,000 tons of stampings at the tractor plant...

But at certain enterprises the assimilation of capacities is going slowly. So having very great significance for solution of this problem is dissemination of the initiative of the front-ranking brigades of A. Vitt, V. Gulyayev, A. Pavlov and A. Turakbayev from the Yermakov Ferroalloys Plant, the Pavlodar aluminum and tractor plants and the Ekibastuzugol' Association, who have proposed to start a competition for the fastest assimilation of the planned productivity of each technological complex and aggregate. The oblast committee of the party supported the initiative and now it has found response at many enterprises of the oblast. The value of the initiative, in our view, is in that it is very specific and relates directly to each worker.

Many enterprises in this plan have accumulated good experience. For instance, at the Yermakov Ferroalloys Plant the work is done in cooperation with the scientific research institutes, whihh have already proposed many effective technological regimes. At the plant itself on the initiative of the brigades of S. Temgin, G. Yefremov, N. Knyazev and A. Sandin they are working under the motto "Model Service and an Increase in the Times Between Repairs for Each Aggregate."

The initiative has spread to the Pavlodar Aluminum Plant. In the calcination shop, where one of the initiators of the initiative, A. Turakbayev, works, the planned hourly productivity of the furnaces was covered by 23 percent. On the whole the new capacities at the plant are being assimilated at an advanced rate.

For two years of the five-year plan the industrial enterprises of the oblast did not operate badly. The plan for the first half of 1978 was covered too. But, despite the high rates of growth, the builders still did not reach the established assignments for the five-year plan. Somewhat underfulfilled by them was the plan for the first half year, and being turned over with a delay are certain major production capacities and facilities for cultural and domestic use, especially in Ekibastuz. This, in particular, was reported by the control post of EKONOMICHESKAYA GAZETA about construction of facilities of the complex. Now all measures are being taken so that the builders too will emerge on the level of assignments of the 10th Five-Year Plan.

Problems Which Should Not Be

The huge scope of the operations requires, naturally, the enlistment of a large number of people. For us today this is an important problem. Moreover it is necessary to think not only about today, but also about tomorrow. For those who are now building the enterprises and will remain to work at them, a whole complex of production and cultural and domestic conditions should be set up. However, causing uneasiness is that certain ministries are trying to curtail very important parts in this complex.

Thus, at the Pavlodar Tractor Plant more than 50 million rubles has already been spent on its erection above the initial estimated cost. In addition, out of 538,000 square meters of living area planned according to the design, only 380,000 meters has been built for the plant. The program for construction of kindergartens was cut out, and means were not allocated for construction of the hospital complex, or the tekhnikum. In our view, the Ministry of Agricultural Machine Building took an improper position in this matter.

Such an approach is characteristic also for the USSR Ministry of the Oil Refining and Petrochemical Industry. The first phase of the oil refinery has gone into operation, but construction of housing and social and cultural and domestic facilities is behind. The ministry is not allocating adequate funds for these projects. Out of a total sum of 31 million rubles intended for erection of the indicated projects, so far less than half has been used. It is necessary for all ministries and departments carrying out the construction of enterprises to direct especial attention to social questions.

There are problems of another sense. The Ekibastuzugol' Association is constantly increasing the rates of fuel extraction. But the planning of the sale and transport of the fuel so far is on a low level. The USSR Ministry of the Coal Industry constantly sets quotas for the association for extraction of coal which exceed the possible volumes of its realization. Namely for this reason all year long the enterprise is among the lagging ones, expecting ultimately an adjustment of the assignment.

And this is not the only misfortune for the coal miners. The matter is aggravated more because the Ministry of Railways is not supplying them with the necessary num er of cars. And certainly in the future the rates of coal extraction will increase even more rapidly. In connection with the growing volumes of operations the transport scheme requires a review throughout the region.

In a word, there are problems requiring immediate solution. It is very important now rapidly to outline and realize the measures for improvement of all party and economic activity, for development of socialist competition and achievement of the best results in fulfilling the assignments of the Tenth Five-Year Plan. A new influx of creative energy for this has been aroused among the communists and all workers of the oblast by the recently held Plenum of the CPSU Central Committee.

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DEVELOPMENT OF TURKMEN GAS INDUSTRY SHOWN

Ashkhabad TURKMENSKAYA ISKRA in Russian 9 Jul 78 p 4

[Article by N. Sosnina, TURKMENSKAYA ISKRA correspondent: "On the Shores of the Steel River"]

[Text] The age of the republic's gas industry is a little more than 10 years. In a compressed period of time the extraction of fuel has been increased a hundred-fold. Experience was accumulated in the country, and much was learned from the first Turkmen gas field, Achak. One after the other the blank spots are disappearing from the map of the Karakums. The sands are being crossed by mighty steel trunk lines, and arising along their shores in the desert are cities with the names of gas fields, and young gardens are growing. The southern kray is being transformed at unprecedented rates, in full accordance with our plans.

There are two ways of moving forward. One is to follow after, without especially straining. The other is to outstrip what has been planned, to adjust the plan in favor of an increase, to create a difficult life for oneself, gradually increasing the volumes of work.

I heard the expression "cumulative growth" from the chief of the Turkmengasprom All-Union Industrial Association, Viktor Andreyevich Talday, and marveled at its accuracy. Judge for yourself. The initially approved plan for the first half of the 10th Five-Year Plan has been covered for a long time. The assignment was reviewed, increased and again overfulfilled--by 4.8 billion cubic meters. Beginning with 1976 the gas workers have produced as much output as during the whole Ninth Five-Year Plan. Whereas during the Ninth Five-Year Plan the drillers of the association opened 15 new sites, almost as many have been prepared during two and a half years of the tenth. The rates, thus, have increased two-fold.

The foundation for such acceleration was laid earlier. Step by step the gas workers have increased their experience and knowledge. Ten years ago on the northern multilayer Achak deposit they successfully used the combined-separation method of exploitation of gas-bearing layers. Now this method,

approved by the whole country, has been introduced in Naip, Northern Achak, and Gugurtli. Thanks to it during this five-year plan the fund of recovery wells has been reduced by 100, and the productivity of labor has increased sharply. Extraction also increased. A benefit was attained because of the reduction of material outlays for drilling, construction and exploitation of those 100 wells which were not needed. Let us note, besides, that the productivity of labor in the association is the highest for the sector in the country.

Shatlyk was organized on the basis of experimental equipment--block-assembly--and the drilling of large-diameter wells. In essence this was a testing ground for the latest methods of extraction. The installations were brought up to "reason," plans were perfected as they went. This was a difficult time but happy time. Participating in the engineering work were hundreds of builders, assemblers, and machine builders. Their initiative, ideas and proposals received instant support and embodiment.

But the chief difficulties began when operating personnel took over the gas field. The first year of the 10th Five-Year Plan presented surprises, which in no way could be called pleasant. Paraffin was detected suddenly, hitherto not encountered in the gas industry. And since the whole benefit of separation consists in freezing, in cooling the gas and having the impurities fall out in the form of sediments, falling out first of all was the paraffin, obstructing the very fine splicings of the technological pipelines and coating the interior surface of the heat-exchangers. The effect of separation, thus, was reduced to nothing.

Moreover, a harmful emulsion was revealed in the condensate. This was also a first in practical experience. It took the unified efforts of scientists in Baku, Saratov and engineers of the Shatlykgazdobych Association to cope with the troubles and to return to production the rhythm and coordination that were lost.

It could have been possible to forget the past, if it had not continued into the present and the future. Taking into account the assignments received in the period of organization at the fields which were born in the 10th Five-Year Plan--the Tedzhensk, Bayram-Ali, Northern and Southern Naip, and Kirpichli--already assembled were more compact, convenient and inexpensive installations for collection and separation of fuel.

But, the main thing is that in these years people have learned to work in the difficult conditions of the Karakums, to control skillfully the processes of extraction of the blue fuel, to solve wisely the complex of technical, organizational and education problems. In a little more than 10 years a strong nucleus of experienced, knowledgeable leaders has grown up in the sector. Coming to Achak as a completely "green" engineer was Khally Orazmamedov, a graduate of the Turkmen Polytechnic Institute. Today he is chief engineer of the All-Union Turkmengazprom Industrial Association. V. A. Talday, M. Ye. Rykov, A. A. Khlopyuk, N. Ya. Sokratov, N. A. Salgalov, and

V. V. Mamontov--these and many other engineers helped to create and advance the gas industry.

Today on the shoulders of the large collective of extractors and gas builders in the republic are stepped-up tasks set forth by the 25th CPSU Congress. "Cumulative growth"--this means not only the amount, but a new, more difficult quality of extraction and prospecting.

The association's drillers are going out into new, unstudied regions of the Karakums. There is a little town called Astanababa. One more administration of drilling operations is to be based here, which will also move into the depths of the desert. It is necessary to check and (it would be a good thing!) confirm the promising areas of Khodzhambas, Akkulyum and others, where gas has been found in subsalt deposits.

In Uchadzhi, despite the doubts of geologists, gas was discovered namely in subsalt deposits. It is necessary to study the whole Uchadzhi swell with precision discharge wells. Kulach, Pionerskaya, Yashvarskaya--these are new structures, new undeveloped regions.

The gas workers are continuing the policy of automation and mechanization. They are learning to build and develop new capacities rapidly and cheaply. They are improving the technology of extraction. Internal reserves of growthare being sought to the maximum and put into service. The transfer of assembly points to remote, telemechanic control is being completed in the current 5-year plan in Shatlyk and being started in Naip and Achak. The next phase of the automated control system will go into operation. The relation between practice and science will become closer.

The appeal of the Rostov workers "To work without lagging" was first taken up in the association by the collective of Shtatlykgazdobych and for its results during two years of the 5-year plan it won the Red Banner of the Ministry of the Gas Industry and the sector trade union.

In setting up the Kirpichli deposit the brigades from subdivisions of Turkmenneftegazstroy under N. Nogosov, K. Stepanaytes, and N. Yakovenko are by their own methods approaching the maximum in the introduction of a new field. It is also very important to maintain high labor morale at the projects of Beurdeshik and Balkuy, where the builders will soon be going.

Unfortunately, not everything is going smoothly yet regarding the engineering preparation for the organization of the deposits. The links of the gas construction are not strong enough and not adequately interconnected. Certain subcontractors, particularly Moscow Trust No 8, and the Sredazneftegazmontazh Trust are violating their obligations. Sometimes the deadlines for delivery of other types of equipment and materials are disrupted.

In the second half of the labor five-year period it is necessary to increase further the rates of extraction and organization. And then new tributaries will appear on the artificial steel river. Central Asia is the Center, and new cities will receive the names of gas fields of the republic.

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